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BASIC COMPUTER CONCEPTS AND FISCAL IMPACT ANALYSIS WITH A COMPUTER: A COMPENDIUM

BY:

ALI MONTASSER, CONSULTANT
McMANIS ASSOCIATES
WASHINGTON, D.C.

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DEPARTMENT OF COMMERCE
COMMUNITY DEVELOPMENT DIVISION

TED SCHWINDEN, GOVERNOR
COGSWELL BUILDING—ROOM C 211
CAPITOL STATION

STATE OF MONTANA

(406) 444-3757
HELENA, MONTANA 59620

September, 1983

Dear Reader:

This publication was produced as part of a September, 1983 workshop sponsored and funded by the Community Assistance Program of the Montana Department of Commerce. The workshop was presented at the Fall, 1983 Montana Association of Planners meeting at Fairmont Hot Springs, Montana. The workshop was titled "Computer Applications in Planning: Fiscal Impact Analysis and Capital Improvements Planning With A Computer."

Mr. Montasser was not able to present his material at the workshop. The following material will be of interest to planners and other local government personnel who are interested in using a computer for fiscal impact analysis of new subdivisions, annexation proposals, and other types of new development.

If you have questions on this material, I suggest you contact:

Ali Montasser
World Bank
International Bank for Reconstruction
and Development
1818 H Street, N.W.
Washington, D. C. 20006
(202) 477-1234

If you have questions on the general techniques of fiscal impact analysis or capital improvements planning, you may wish to contact the Community Assistance Program.

Sincerely,

ROBB McCRACKEN
Planner IV
Community Assistance Program
Community Development Division
Department of Commerce

RMcC:mw

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publications & graphics

Mr. Montasser will not be able to personally present this material at the Fall 1983 MAP meeting. Mr. Montasser has very recently left McManis Associates to join the World Bank. The following materials are fairly detailed and, although they are no substitue for having Mr. Montasser here in person, the following information will be of real interest and use to local officials.

SECTION A

Background information on
Ali Montasser and McManis Associates

ALI S. MONTASSER
Senior Associate

Mr. Montasser, a Senior Associate with McManis Associates, has more than 16 years' experience with information management, systems analysis, and computer programming and more than nine years of professional experience with economic and fiscal impact analysis and related computer modeling. His functional experience includes computer program design and implementation, computer related analysis, systems design, requirements analysis, feasibility studies, turnkey microcomputer systems, and project management. Mr. Montasser's application experience includes public school systems, job corps centers, manufacturing facilities, technical libraries, national associations, management information and financial processing and analysis systems for state, regional, county, and local governments as well as corporations and land developers. In addition, Mr. Montasser has published numerous articles and papers on program and system documentation, the aspects of requirements analysis, and computerized financial analysis. He has conducted seminars and workshops on programming languages, data base structures, computer concepts, and software/hardware selection.

Significant assignments in which Mr. Montasser has participated include the following.

Financial Management, Planning, and Analysis

- Directed the development of MUNIES III, the Municipal Impact Evaluation System, a nationally marketed fiscal analysis computer model. Designed and programmed FISCALS, the Fiscal Analysis System, a nationally marketed, interactive, conversational computer model available on an international time sharing service. Directed the development of CIPS, the Capital Improvements Programming System, for use by municipalities in analyzing the bonding impact of capital projects.

- Managed numerous fiscal analysis contracts for public and private clients to evaluate the impact of municipal comprehensive plans, alternative growth plans, general development plans, zoning cases, capital improvement plans, and managed site specific projects such as residential developments, mixed use developments, and power plant construction.

- Conducted the fiscal impact analysis of the development of the "new downtown" in Washington, D.C., and of Washington, D.C., comprehensive growth plan alternatives for the Office of Planning and Development.

Financial Management Systems

- Developed a systems conversion plan and associated conversion plan documents including computer programming specifications for the conversion of the Business Tax Information System (BTIS) operated by the Department of Finance and Revenue, Government of the District of Columbia. The plan addressed converting the BTIS to an entirely new data base format in order to facilitate improved control of business tax revenues, comprehensive management reporting, and increased flexibility in data entry and inquiry.

- Project director for the development of a functional description document and a systems specification document for the National Futures Association (NFA) Membership Registration and Receivables System (MRRS). The system is to be implemented on an IBM 4341 computer in Chicago, Illinois.

- Project director for the development of a requirements analysis of a large scale, on-line financially oriented data base system for the National Futures Association (NFA) in Chicago, Illinois. The analysis assessed: both short-term and long-term data processing goals, guidelines, and constraints; data processing alternatives within specific application areas; and the alternative availability of both in-house and other resources available to perform systems design, computer programming, and hardware implementation.

- Project director for the financial modeling of the District of Columbia Public Schools. The modeling alternatives included the projection of existing trends and operations to the year 1992, the implementation of a middle school configuration, and a "school cluster" configuration. The final product was the "bottom line" cost to the school system under each operating alternative.

Management Information Systems

- Project manager for the development of a custom keyword text information retrieval system for use by Westinghouse Electric Corporation technical libraries. The keyword system enables library users to search automatically for library documents by scanning keywords in document abstracts. Searches can be conducted by author(s), data range(s), publication date, and subject matter keyword(s). The system was implemented at the Westinghouse Research and Development Laboratories in Pittsburgh, Pennsylvania.

Mr. Montasser is a member of the Independent Computer Consultants Association (ICCA), the Urban and Regional Information Systems Association (URISA), the Municipal Finance Officers Association (MFOA), and the American Planning Association (APA). He received a BA diploma from the University of South Florida where he majored in corporate finance and economics.

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Research Consultants

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IN
BUDGET SYSTEMS DEVELOPMENT

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201 Sansome Street • San Francisco, Ca. 94104 • (415) 398-3087

McMANIS ASSOCIATES, INC.
QUALIFICATIONS
IN
BUDGET SYSTEMS DEVELOPMENT

McManis Associates, Inc. is a management and research consulting firm located in Washington, D.C. with an office in San Francisco, California. The firm offers management and organizational consulting assistance to public and quasi-public entities--governmental agencies at the local, state and federal levels as well as educational institutions and professional and trade associations. Founded in 1964, the firm has assembled a team of highly qualified professionals with experience and skills in:

Public policy analysis at the federal, state and local level;

Management of large and complex public organizations;

Applying innovative strategic planning, resource allocation and performance management techniques to the operation of governments;

Over the years McManis Associates, Inc. has demonstrated its ability to design and implement effective bugdet and resource management systems at all levels of government. The following are representative examples of work performed by the firm and its professional staff.

FOR FEDERAL AGENCIES

Department of the Treasury, Internal Revenue Service.

Develop a predictive model for determining the additional income that would be generated by allocating more staff to each of the Service's enforcement activities. The model is to be used by the Office of Management and Budget, the Secretary of the Treasury and the Commissioner of IRS in evaluating budget alternatives.

Department of Agriculture, Agricultural Stabilization and Conservation Service.

Redesign the budget system for this major bureau.

U.S. Forest Service.

Assist in the design and development of a renewable resources strategy and budgeting system.

Department of Agriculture, Farmers Home Administration

Design and develop productivity and resource management system used for budgeting, staffing, and operational management; develop an automated staff projection system using budget work standards based on functional work measurement standards.

U. S. Nuclear Regulatory Commission

Design and develop an integrated resource management system which included methodology for forecasting and allocating resources and use of this methodology in an automated budget process.

Joint Financial Management Improvement Program

Conduct study and prepare booklet, Operating Budgets: A Practical Approach; organize and conduct federal and intergovernmental financial management conferences.

U.S. Atomic Energy Commission

Serve as deputy assistant controller for budgets responsible for operation and continuing development of a cost-based budget system integrated with the accounting system.

Tennessee Valley Authority

Serve as budget analyst and assistant to chief budget officer with responsibilities for operation and continuing development of program budget system integrated with the accounting system.

FOR STATES

State of Tennessee.

Develop a system for determining capital improvements budget priorities, region by region, within the State that would enable the Budget Office to assemble a comprehensive statewide capital budget which reflects regional and local priorities.

State of Arkansas.

Design analysis process within executive budget office to focus review of annual appropriations requests on policy implications of alternative funding levels to facilitate development of the Governor's budget.

State of New Jersey.

Refine resource allocation system used by State Board of Higher Education to recommend funding for state-supported higher education to the governor and legislature.

State of Indiana.

Revise process for analyzing higher education appropriations requests within executive budget office.

State of Idaho

Installed and applied a fiscal impact/planning model for this state government. The project included the projection of statewide revenues based on a one percent tax limitation for state jurisdictions.

FOR LOCAL GOVERNMENTS

Minneapolis, Minnesota.

Design a new activity based budget system and an accompanying chart of accounts and prepare appropriate procedures manuals for departmental use in budget preparation. Develop performance standards, productivity measures and monitoring procedures to be used in conjunction with the new budget system.

New Orleans, Louisiana.

Design improved budget procedures to complement a new policy planning and project management system developed for the City.

San Juan, Puerto Rico.

Design a performance budget system that determines resource requirements (staff, equipment, facilities and materials) on the basis of levels of service to be delivered or volume of output to be generated.

Washington, D.C..

Develop a planning/programming/budgeting process for the criminal justice system in the City and pilot test it in the Department of Corrections.

Duluth, Minnesota.

Design a chart of accounts based on cost centers and train staff in the use of the resultant budget process and of a new computer-based financial management system to support it.

Erie, Pennsylvania.

Design and guide implementation of a comprehensive policy planning and budget system that allocates and tracks resources by type of service rendered.

Huntsville, Alabama.

Design a revenue requirements forecasting system and associated procedures for establishing service fees based on projected increases in capital investment and operating costs for municipally owned utilities.

Oklahoma City, Oklahoma.

Train cross section of department directors and staff in techniques for determining budget levels on the basis of projected service delivery requirements.

Salt Lake City, Utah.

Develop a program budgeting and financial management system for the City's police and fire operations. Design a five-year capital expenditures planning, budgeting and monitoring system for all City departments. Design a performance budgeting system for the public works department.

Tallahassee, Florida.

Design a financial control system that monitors budget compliance and assesses the impact of planned development on public facilities and on the environment.

Tampa, Florida.

Design a fiscal management system that allocates and track resources by function.

Trenton, New Jersey.

Develop improved policy planning and budgeting procedures and design an organizational structure capable of implementing these procedures.

San Diego, California

Provided and implemented a fiscal impact analysis system to assist in the evalution of a major growth management study for the Department of Budget.

Washington, D. C.

Conducted fiscal impact evaluations of the development of the "new downtown" in Washington, D. C. and the Washington, D. C. comprehensive growth plan for the Office of Planning and Development.

Washoe County, Nevada

Conducted fiscal impact analyses of alternative residential and mixed-use developments. The project incorporated separate fiscal evaluations for a fire district and county school system.

Greece, New York

Installed a fiscal impact evaluation model for this community. The first project was to analyze a proposed large, free-standing mixed-use development. A second project was to project and analyze a capital improvements program as part of their comprehensive planning process.

Southeast Idaho Council of Governments, Pocatello

Performed fiscal and budget analysis for this council of governments. The analyses included the evaluation of new dam construction near the city of American Falls and the regional evaluations of a seven-county area to assess the municipal consequences of phosphate deposit mining in terms of additional waste water treatment facilities, public schools, and other basic municipal services.

FOR OTHER PUBLIC INSTITUTIONS AND AGENCIES

Florida A and M State University.

Design system to link development of the university's internal operating budget to the development of the biennial request for state appropriations.

College of the Virgin Islands.

Design presentation of the college's appropriations request to the legislature. Develop model to project long range income and expenditures.

SECTION B

Basic Computer Concepts
and
Selection Criteria

BASIC COMPUTER CONCEPTS AND COMPUTER SELECTION CRITERIA

Exhibit Number	Exhibits
1	General Components of a Computer System
2	Analyzing, Choosing, and Implementing A Computer System
3	A Computer System Acquisition Check List
4	Computer Terminology
5	Bibliography for Microcomputers
6	A Guide to Software
7	Comparison of Personal Computer Memory Sizes
8.	Computer System Selection

Exhibit #1

GENERAL COMPONENTS OF A COMPUTER SYSTEM

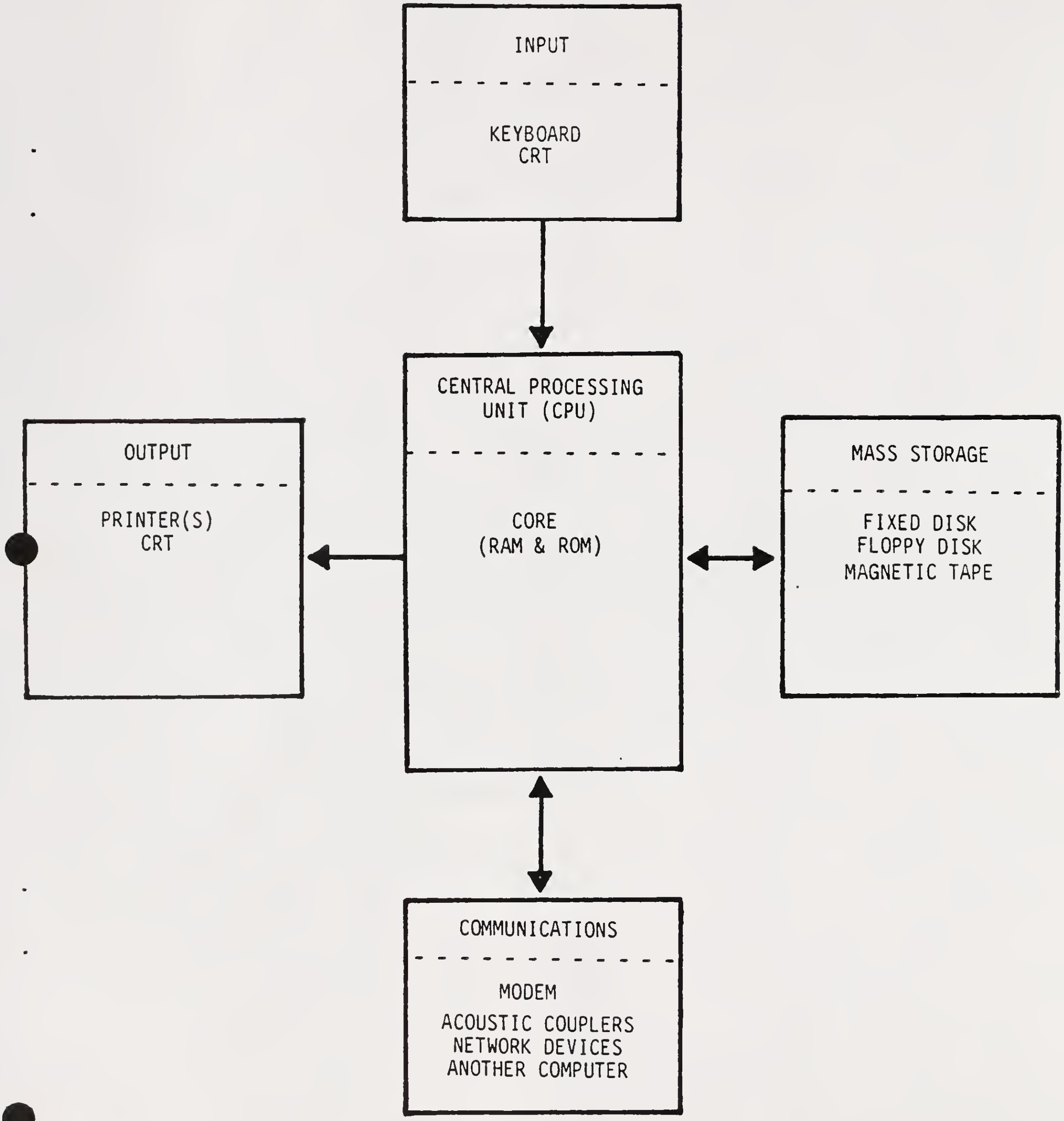

EXHIBIT 2

ANALYZING, CHOOSING, AND IMPLEMENTING A COMPUTER SYSTEM

I. REQUIREMENTS ANALYSIS

The requirements analysis will set the stage for purchasing hardware and software or for making no purchase at all. The requirements analysis can take two weeks to six months to complete. It consists of the following steps.

A. List Current Functions

1. Office administration
2. Grants administration
3. Budgeting
4. Analytical tasks
5. Record keeping and data management
6. Report writing

B. Determine Which Functions Can Benefit From Automation

1. Where can time be saved?
2. Where can productivity be increased?
3. Can the level, quantity, and quality of analysis be improved?
4. Can record keeping be made easier and data retrieval be improved?

C. Set Goals and Objectives for Automating the Office

1. Concentrate on improving existing capabilities, not on creating new ones.
2. Build a logical case for how a computer will help the agency perform its role better.
3. Include your staff in the requirements analysis.

D. Summarize Your Findings In Written Form

1. List the proposed applications.
2. Explain why you feel a computer will help your agency perform its job better.
3. Point out areas where the computer will save money and improve the capability of your agency to perform its functions.
4. Write down goals and objectives to aid you in the search for software.

II. COMPUTER SYSTEM REQUIREMENTS

The selection of software should precede the choice of hardware. This is to determine if you have to "make" or "buy" software--which can have a large influence on the selected hardware.

A. Software Selection

1. Use the requirements analysis to help you select the software

   a. Software selection should be based on the applications developed in the requirements analysis.
   b. Applications might include word processing, an electronic spreadsheet and a database structure.

2. Locate sources of software and information (such as reliability and support)

   a. Contact other agencies
   b. Contact independent consultants
   c. Locate users groups and organizations
   d. Books and publications

      1. Popular Computing
      2. Personal Computing
      3. Datamation
      4. Infoworld
      5. Byte
      6. Magazine specific to the machine you may purchase

3. Testing software

   a. All software should be tested with a hands-on demonstration.
   b. Avoid standard "demos".
   c. Draw up a list of specific questions as they relate to your application.
   d. Have the people who are going to use the software try it out first.
   e. Get references from existing users.

4. Check for software support

   a. Call the publisher.
   b. Ask questions of the vendor.
   c. Learn about fixes, changes, and updates to your software.

5. Machine Compatibility

   a. What hardware is required to run the software?
   b. What operating system does it use?

B. Hardware Selection

Hardware selection need not be complex if you have a clear idea of what types of tasks you intend to perform. This should be based on the requirements analysis and software selection.

1. Hardware should be determined by software.

2. Software will often dictate the type of hardware required.

3. Choose the central processing unit (CPU) using the following criteria:

   a. Should have minimum of 64K of Random Access Memory (RAM).

   b. "Expandability"; memory should be expandable beyond 64K.

   c. Should have a full size keyboard with function keys and a numeric keypad (at least as an option).

   d. Graphics ability.

   e. Complete operating manuals.

   f. Warranty--90 days or better.

   g. Repair and service should be available locally and on-site.

   h. Should have non-glare screen.

   i. Keyboard layout should be comfortable for the user.

   j. A detachable keyboard is desirable although not essential.

   k. Upper and lower case letters should be on keyboard.

   l. Type of microprocessor is less important than available software.

4. Disk Storage

   After you decide on the CPU, decide on disk storage.

   a. Minifloppies (5¼")

      1. Sufficient for analysis, light word processing, limited databases. A single sided, single density diskette holds approximately 102,000 bytes. This is equivalent to about 24 pages of text.

b. 8 inch floppies

1. Better for word processing, moderate databases. A single sided, double density diskette holds approximately 480,000 bytes. This is equivalent to about 110 pages of text.

c. Hard disks

1. For databases, multi-user systems, and networking. Start at 2.5 megabytes. This is equivalent to about 600 pages of text.

5. Printers

a. Letter quality

1. 30 cps up to 60 cps.
2. 80 to 132 characters.

b. Dot matrix

1. 60 CPS and up.
2. 80 to 132 characters.

6. Modems

a. Another computer.
b. Communications networks.

III. CHOOSING A SYSTEM

"Capability and capacity" should be the bywords when finally choosing a system. This step should only take place after all the preceding steps have occurred. The following elements are involved.

A. Expandability

B. Available Software

C. Available Peripherals

D. Support (service and maintenance)

E. Where to Buy

F. How to Buy

G. Final Decisions

IV. IMPLEMENTATION

A. Provide the Physical Environment

  1. Placement of the computer
  2. Storage of supplies
  3. Storage of software

    a. systems backup
    b. disk storage

  4. Electrical (prevent voltage changes)

  5. Heat and humidity

B. Determine Responsibilities

  1. Who will operate the system?
  2. Who will maintain the software?

C. Training the Staff
(Finding time can be a problem.)

  1. Games
  2. Hardware and software documentation
  3. Determine who will provide continued training (due to employee turnover)

D. Design Applications

E. Set Up Maintenance Procedures

V. OUTSIDE ASSISTANCE

A. County Data Processing Department
B. Software Vendors
C. Hardware Vendors
D. Independent Computer Consultants

VI. COMPUTER SURVEY

A. Equipment Configurations
B. Software for the Public Sector
C. Purchase/Lease/Finance Cost

  a. Hardware
  b. Software

D. Maintenance Costs of Computer Hardware
E. Installations/Current Applications

EXHIBIT #3
A COMPUTER SYSTEM ACQUISITION CHECK LIST

I. REQUIREMENTS ANALYSIS

1.______ Report writing and revisions
2.______ Record keeping and information retrieval
3.______ More timely and accurate data analyses
4.______ Preparation of charts and graphs
5.______ Accounting and grants management
6.______ Improved management of large projects through computer assisted PERT and CPM
7.______ Improved capability for better overall information management

II. SOFTWARE SELECTION

1. Performance

______ Does it perform the desired function?
______ Speed of execution
______ Level of accuracy
______ Type and number of features
______ Does it meet your agency's needs?

2. Documentation

______ Does it tell you how to use the program's features?
______ Instruct you on how to perform your particular application?
______ Does it contain a reference card?
______ Does it have an index?
______ Is it readable and easy to follow?
______ Does it contain a tutorial?

3. Ease of use

_____ User-friendly
_____ Easy to input data
_____ Menu-driven
_____ "Help Screens" available

4. Error Handling

______ Does the program provide recovery from error?
______ Does it protect the user from inadvertent data loss?

5. Customer Support

______ Local support from vendor
______ Telephone support from publisher
______ Training provided by vendor
______

III. HARDWARE SELECTION

1. Central processing unit (computer)

______ Minimum of 64k of internal RAM
______ Full-sized keyboard
______ Minimum 9 inch monitor
______ Minimum 40 x 24 display--80x24 desirable
______ Graphics available--preferably built-in
______ Expandable memory
______ Numeric keypad (at least as option)
______ Upper and lower case letters
______ Function keys for quicker program execution
______ Expansion slots for addition of other options at later time
______ 8 bit microprocessor
______ 16 bit microprocessors
______ Dual microprocessors (8/16)

2. Mass storage

______ Minimum of 143k per disk--320 desirable
______ Hard disk should be available
______ Minimum of two floppies--8" drives preferable

3. Printers

______ Minimum 120 cps for dot-matrix
______ Minimum 30 cps for letter quality

4. Interfaces

______ RS-232 Serial Interface for printers and communication devices

5. Operating Systems

______ UCSD Pascal
______ CP/M-80
______ CP/M-86
______ MS-DOS
______ Oasis
______ Proprietary

6. Miscellaneous Devices

______ Plotters
______ Light Pens
______ Modems
______ Digitizers and graphics tablets
______ Other CPU chips

Exhibit #4

COMPUTER TERMINOLOGY

ACCESS: the process of obtaining data from, or placing data into, some form of storage.

ADDRESS: physical location of an instruction/datum in internal memory/on any medium.

ADP: Automated Data Processing. See EDP.

ALPHANUMERIC: name to designate any alphabetic, numeric, or special character.

ANALYST: a person who defines problems and develops methods and procedures for their solution. Systems Analyst--The architect of the system of procedures which will accomplish a given task.

APPLICATION PROGRAM: a program designed to handle a specific application or problem, such as Accounts Receivable. (See program, software ... contrast with card, interface, hardware.)

ASCII: American Standard Code for Information Interchange. This is a seven bit code that defines letters and numbers that the computer uses as its input.

ASSEMBLER: that portion of the central processing unit which translates symbolic (or high level) program language into assembler (or machine) language which the computer itself understands.

BACKUP: provision for copying data and programs for protection against damage or loss.

BASIC: Beginners All-Purpose Symbolic Instruction Code. A computer language frequently used on microcomputers.

BATCH SYSTEM: data processing in which a number of similar input data items are grouped together before they are processed. Used extensively in applications with high input volume, where there is no great need for fast response times.

BINARY: the number system utilized by the computer which consists of only two numbers, zero and one, to signify the characteristic of a selection in which only two possibilities exist, e.g., "on" or "off" and "yes" or "no".

BIT: an acronym for Binary Digit. The smallest unit of measure in a computer word; several bits make up a byte, or a computer word. A bit can have only the binary values of 0 or 1.

BOOT/BOOTING: the process of loading an operating system into main memory.

BUFFER: temporary data storage in main memory/peripheral memory used to balance the different rates of data transfer. This is a holding area for information to equalize or balance two different operating speeds. For example, the output of the computer might be too fast for a printer, so the information would be held in a buffer until the printer could accept the next batch of data to be printed.

BUG: the cause of a malfunction, usually in a program. They are called "bugs" because they can be hard to find.

BUS: electronic pathways for peripherals within a computer ... has some "controlling" capabilities. A wire that carries an electrical signal to two or more printed circuit boards. A bus structure would be many bus lines that carry many different signals. (See I/0 Ports.)

BYTE: group of bits, usually 8, smallest meaningful and uniform data storage unit within a computer. Each byte represents one number, letter, or special character.

CAI: Computer Aided Instruction. The step-by-step, interactive process where the computer leads the student through concepts to be learned.

CARD PUNCH: a device which records information on cards by punching holes in them to represent letters, numbers, or special characters.

CARD READER: a device which reads the holes in a punched card and translates them into a form recognizable by the computer.

CARD: a board containing circuitry providing logic/control signals between different devices, also know as firmware. (See interface ... contrast with software, hardware.)

CASSETTE STORAGE: in a personal computer we can use an ordinary audio cassette player to store information through a special interface.

CHIPS: small rectangular objects of semiconductor material containing microminiaturized electronic circuits.

COMPILER: computer program which converts another program, usually an applications program, into machine code which can then be run. (Compare with interpreter ... contrast with card, interface, hardware.)

COBOL: Common Business Oriented Language. This computer language was developed for use in business applications.

CODE: a set of rules specifying the manner in which data may be represented.

CP/M: Control Program for Microcomputers. This is an operating system developed by Digital and used on some computers.

CPU: Central Processing Unit. Controlling center of a digital computer system which processes data, supervises and coordinates the various functional units of the computer system, and provides primary storage capacity. Major components of the CPU are: a control unit; an arithmetic/logic unit; and a storage unit.

CRT: Cathode Ray Tube. The video screen used in monitors and terminals. Your computer's "TV screen," showing you what's in there. The CRT is your computer's way of talking to you. It is also referred to as a display unit or terminal.

CURSOR: a blinking bar-line character used to show where the computer's attention is focused.

DAISY WHEEL PRINTER: a printer with a daisy wheel head, which is circular in shape with spokes at the end, each one holding a letter or symbol. It provides an efficient means of letter-quality printing.

DATA: the information that gets processed when your program runs. Data is all the information you have your computer use, everything that you put into your computer to store and retrieve.

DATA BASE: a collection of data accessible by programmed instructions.

DBMS: Data Base Management System. A DBMS is a software tool that provides an integrated source of data for multiple users, while presenting different views of the data to different users. It can be characterized as generalized software which provides a single flexible facility for accommodating different data files and operations while demanding less programming effort then conventional programming languages. It features easy access to the data; facilities for storage and maintenance of large volumes of data; and most importantly, the capability for sharing the data resources among different types of users.

DATA PROCESSING: the function of the computer, to manipulate and structure information, generally in the form of numbers.

DISK: a magnetic recording device for storing programs and other information.

DISKETTE: thin flexible platter coated with magnetic material used for storage with microcomputers. Available in 8" and 5¼" sizes. (See floppy disk.)

DOS: Disk Operating System. A computer operating system/program designed to be used with disk drives.

DOT MATRIX (printer): impact printer using a simple print head made up of several wires which combine to form characters.

DP: Data Processing. A collage of two terms in today's popular usage: "computing" and "data processing." Computing means setting up procedures for obtaining numerical output. Data processing usually involves such manipulations as storage, retrieval, sorting, merging, updating, assembling, searching, reading, writing, and erasing.

EDP: Electronic Data Processing. Data processing (see DP) assisted by computer, sometimes without human intervention (unattended operation).

EPROM: Erasable Programmable Read Only Memory. Erasable PROM, ROM memory which can be reprogrammed by the user after ultraviolet erasing. (see ROM, PROM).

FIELD: one logical item of data within a record. (Such as a name ... see file, record.)

FILE: A logical grouping of like records that are maintained on a storage medium. (See also field, record.)

FLOPPY DISK: storage medium that is a thin flexible platter magnetically coated. (See diskette ... 5¼" can hold approximately 40 single spaced typed pages. 8" can hold approximately 100 pages.)

FORTRAN: FORmula TRANslator, a computer language designed primarily for scientific and engineering applications.

GIGABYTE: 1 billion bytes, abbreviated GB.

HARD COPY: copy of computer generated output that can be kept as a permanent or semi-permanent record. (A print out, for example.)

HARD DISK: solid magnetic recording device rotating at very high speeds and able to store considerably greater volumes of data than diskettes. (Hard disks can hold over 120,000 typed pages.)

HARDWARE: the physical components or elements of a computer system. (Compare with interface, card--contrast with software.)

INPUT: the information that goes into your computer system.

INTERFACE: electronic circuitry that allows two different devices to be joined; it can be a buffering function. A connector that "translates" between two parts of a system. You generally need one interface for each peripheral that you hook to your computer. (See card, buffer--contrast with software.)

INTERPRETER: computer program which reads/interprets an application program. It works on a "line by line" basis. Each line is converted into machine language code and executed immediately, and then the next line is read. (Compare with compiler--contrast with hardware, card, interface.)

I/0: Input/Output, the transfer of data into and out of the computer.

I/0 DEVICE: any peripheral designed to transfer data into or accept data from a computer for output.

I/O PORTS: connector locations in a computer system that let data be passed between the computer and peripheral devices. (See bus.)

K: (As in 32K bits, 32K bytes or 32K words). K, short for Kilo, meaning 1,000, is usually used within the computer industry to mean 1,024. Therefore, 32K usually means 32,768. K often measures storage capacity, either in bits (zeros and ones), bytes (usually groups of eight bits), or words (usually two or four bytes).

KEYBOARD: typewriter-like device used to input alphanumeric information to the computer in appropriately coded BINARY patterns.

KEYPAD: set of numerical keys, arranged like those of a calculator, added to the normal keyboard.

LANGUAGE: stylized system for writing programs in an English-like format.

LED: Light Emitting Diode. A crystal that glows when electric current passes through it. A matrix of LEDs can be used to display numbers and letters by passing current through appropriate members of the matrix. Members are chosen by outside logic circuits.

MACHINE CODE: machine language/"native language" that the computer can understand directly.

MAINFRAME: physically large and powerful computers. Memory size usually begins at 1 million bytes. Cost is $100,000 and up.

MASS STORAGE: any way of keeping a lot of information outside your computer, but available to it. This is part of your computer's "memory". Most common kinds of mass storage are tape and disk.

MEGABYTE: one million bytes, abbreviated MB.

MEMORY: portion of CPU where operating system, applications programs, and their data are stored when in use. (See RAM, ROM.)

MICROCOMPUTER: small computer for home and professional use. Designed around a single microprocessor. Memory size from 1K to 1MB. Smallest units cost under $100; the most useful configurations range in price from $2000 to $10,000.

MICROPROCESSOR: integrated circuit chip containing the basic logic circuits of a computer. The chip or chips that are the building blocks of your digital watch, personal calculator, and now your personal computer.

MINICOMPUTER: medium sized computer for business. Can be designed around a cluster of microprocessors, always has more than one processor chip. Memory size ranges from 64K to 3GB, and price ranges from $18,000 to $100,000.

MIS: Management Information System. An EDP system specifically designed to provide business management with company financial or project data as requested.

MODEM: MOdular/DEModular device to permit computers to talk to each other over communications media. Changes digital to audio and then audio to digital signals.

MODULARITY: the capacity of equipment to be added onto with extras rather than being totally replaced when it grows obsolete.

MODULAR PROGRAMMING: the segmentation of a large program into a number of small, self-contained subprograms or subroutines.

MOTHERBOARD: a printed circuit board with a specific bus structure that many different kinds of printed circuit boards can be plugged into.

NETWORKING: linking together data processing and word processing machines along with other office machines so that employees can transmit and receive information at their work stations.

OBJECT CODE: name of machine code program created by a compiler from application's source code.

OFF-LINE SYSTEM: a system in which data is recorded on a machine-readable medium, instead of being transmitted directly to or from the computer.

ON-LINE SYSTEM: the operation of terminals, files, and other auxiliary equipment under direct, absolute control of the central processor to eliminate the need for human intervention at any stage between initial input and computer output.

OPERATING SYSTEM: program that "operates" the computer, handles I/0, and protects the application program from harm. (See program, software--contrast with interface, card.)

OPERATOR: the person who physically operates the computer, loads and unloads tapes or cards, and performs all functions necessary for the operation of the hardware. Distinguished from "systems analyst," "programmer," or "key operator".

OPTICAL SCANNER: a device which reads printed or written data and conveys its meaning to the central processing unit or to a storage device.

OUTPUT: using the program you have put into your computer as the instructions and the data for information, the output is the finished product your computer system produces.

PARALLEL I/0: this type of interface transmits and receives data on a batch mode, where there are several signals interchanged at the same time. These kinds of transfers can happen very fast, but can't be sent too far.

PERIPHERAL: any device other than the CPU. The devices attached to your computer, such as the display, keyboard, printer, etc.

PROGRAM: an organized set of logical instructions directing the execution of a specific task or the solution of a problem by the computer. (See application program, compiler, interpreter, operating system--contrast with interface, card, hardware.)

PROGRAMMER: a person responsible for designing, writing, and testing computer programs.

PROM: Programmable Read Only Memory. A type of ROM memory which can be initially programmed with a desired set of instructions or patterns by the user rather than the manufacturer. Once programmed, they are permanent. (See EPROM, ROM, RAM.)

RAM: Random Access Memory. Temporary storage used by a computer to allow a user to change data entered into it. Any address location can be accessed as easily as any other. Random Access Memory loses its contents as soon as electric power is turned off. (See EPROM, PROM, ROM.)

RECORD: a group of related data made up of one or more fields within a file (for example, all the data on one person in a personnel file). (See field, file.)

ROM: Read Only Memory. A type of memory whose contents will not change when the power goes off. It has been programmed to give out the same kind of information all the time. It is generally set at the factory, and cannot normally be altered/erased by computer programs. (See EPROM, PROM, RAM.)

RS-232: an industry standard for the serial transmission of data to peripheral devices like printers or MODEMS. (See serial.)

SERIAL: transmission where bits are sent one after the other over a pair of wires. One wire sends information and the other receives.(See RS-232.)

SERVICE BUREAU: an organization that sells and provides data processing services, computer time, and/or program development and support.

SOFTWARE: program/group of programs which instruct a computer to perform a specific task/group of related tasks. Software can be of three types: systems, applications, or operations. (Contrast this with interface, card, hardware--see compiler, interpreter, application program, operating system.)

SOURCE CODE: program written in a programming language (contrast with object code).

TAPE: an external storage medium in the form of a ferrous oxide coating on a reel of metallic or plastic tape on which bits may be recorded magnetically as a means of retaining data.

TELEPROCESSING: a type of information processing wherein communication facilities are used.

TERMINAL: a unit for conversing (input or output) with your computer. It has a keyboard, plus display or print-out.

TIME-SHARING SYSTEM: an on-line system in which many users share availability of a remote central computer.

TURNAROUND TIME: the elapsed time between the submission of a job to a data processing center and the completion and return of the finished product.

TVT: "Television Typewriter." A keyboard and associated electronics specially designed to turn your TV into a computer terminal.

WINCHESTER DISK: sealed hard disk with built in heads. Its storage capabilities range from 3 to 40MB, and prices are from $2,500 and up.

Exhibit #5

SELECTED BIBLIOGRAPHY FOR MICROCOMPUTERS

I. PERIODICALS

Byte - monthly

Byte Publications
70 Main Street
Petersborough, NH 03458
$19/year

Has the largest circulation of microcomputing periodicals. The high point of *Byte* is the advertising which tends to overshadow the articles. A typical issue exceeds 500 pages in length.

Creative Computing - monthly

Ahl Computing, Inc.
Post Office Box 5214
Boulder, Co. 80321
$24.97/year

This periodical focuses on computer applications and software. There is a balance between the articles and regular features and the advertising. A typical issue is in the 250-300 page range.

Infoworld - weekly

Popular Computing, Inc.
375 Cochituate Road
Box 880
Framingham, MA 01701
$25/year

Infoworld is a newsweekly for microcomputer users which reviews both software and hardware. It probably contains the best and most up-to-date reviews of software. Some advertising, but mostly reviews and short news items. Typical length is under 100 pages.

Microcomputing - monthly

Wayne Green, Inc.
Post Office Box 997
Farmingdale, NY 11737
$24.97/year

This periodical tries to blend articles dealing with both hardware and software as well as other features such as book reviews and editorials. A good balance between advertising and articles. Average length is about 200 pages.

Personal Computing - monthly	Hayden Publishing Company Post Office Box 2942 Boulder, Co. 80322 $18/year

This periodical is geared to a wide range of readers with regular feature articles for educators, businessmen, professionals/managers, home users, and advanced users. Deals with software and hardware questions. Average length 200-250 pages.

II. BOOKS

This section lists only those books which deal with microcomputers in general and not with specific machines, i.e., Apple, Radio Shack, IBM.

A. General Information

Business Systems Buyers Guide	Adam Osborne with Steven Cook Osborne/McGraw-Hill 1981 $7.95
Compu-Guide: A Consumer's Guide to Small Business Computers	Martha Eischen Dilithium Press 1982 $14.95
The First Book of Microcomputers	Robert Moody Hayden Book Company 1978 $6.50
An Introduction to Microcomputers	Adam Osborne and David Bunnell Osborne/McGraw-Hill 1981 $12.95
A Practical Guide to Small Computers	Robert M. Rinder Monarch Press 1981 $9.95
Small Computers for the Small Businessman	Nicholus Rosa and Sharon Rosa Dilithium Press No date $12.95

B. Software

A Guide to Computer Program Directories	National Bureau of Standards NBS Special Publication 500-22 U.S. Government Printing Office Published periodically No price

Datapro Directory of Software	Datapro Research Corporation Delran, NJ No date No price
International Directory of Software 1982-83	Computer Publications, Inc. 1982 $145.00
VisiCalc Home and Office Companion	David W. Castlowitz and Lawrence Chisausky Osborne/McGraw-Hill 1982 $15.95
Word Processing Printer	Mitchell Waite and Jilie Arca BYTE Books 1981 No price

C. Programming

Advanced BASIC	James Coan Hayden Book Company 1981 $10.75
Apple Backpack: Humanized Programming in BASIC	Scott Kamins and Mitchell Waite BYTE Books 1982 $14.95
Basic BASIC	James Coan Hayden Book Company 1981 $10.50
Introduction to Pascal Including UCSD Pascal	Rodney Zaks Sybex, Inc. No Date $14.95

D. Miscellaneous

How to Become a Successful Computer Consultant	Leslie Nelson Essex Publishing Company 1980 $28.00
Microcomputer Data Communications Systems	Frand Derfler No date $12.95

III. USED EQUIPMENT

The following two publications contain classified ads for software and used equipment.

Computer Trader
1704 Sam Drive
Birmingham, AL 35235

Computer Shopper
Post Office Box F153
Titusville, FL 32780

Exhibit #6

A GUIDE TO EXISTING SOFTWARE FOR MICROCOMPUTERS

Very little off-the-shelf software written specifically for municipalities currently exists at this time. While the situation will probably change over time, agencies will need to learn to adapt existing software to their purposes or write their own. The following computer programs are currently available for microcomputers and are adaptable for municipal applications. Included in the listing are the program title, the publisher, the cost, and the machine configuration necessary to run it. The list is divided into three sections: wordprocessors, electronic spreadsheets, and databases. The prices on all software continue to fall due to increased market competition.

I. WORDPROCESSORS

Title: WordStar
Publisher: MicroPro International
Price: $375 to $500 depending on machine
Machine: Any CP/M based machine

Comments: The standard in wordprocessing programs for microcomputers. A very complex program to learn to use; count on buying additional documentation from other sources. Documentation has been improved over original version.

Title: Select
Publisher: Select Information Systems, Inc.
Price: $595
Machine: Any CP/M based machine

Comments: Currently WordStar's major competitor. Rumored to be easier to use and as powerful.

Title: Perfect Writer
Publisher: Perfect Software
Price: $389
Machine: Any CP/M based machine

Comments: New to the market place. Contains many built in features which are extra on other wordprocessors. Worth investigation especially on a limited budget.

Title: Applewriter II
Publisher: Apple Computer Co.
Price: $150
Machine: Apple II+

Comments: A user friendly program which contains most of the features necessary for wordprocessing. Its ease of use makes it ideal for report writing for those agencies who already have an Apple.

Title: Screenwriter II
Publisher: Sierra On-Line Systems
Price: $129
Machine: Apple II+

Comments: Leading wordprocessor on the Apple II after Applewriter II. Extremely powerful, supports many features such as lower case, 70 column display, and print spooling. Much less user friendly than Applewriter II. Not recommended for dedicated wordprocessor, but excellent as a report writer and staff oriented wordprocessor.

Title: Scriptsit
Publisher: Tandy Corporation
Price: N.A.
Machine: Radio Shack TRS-80, II, III, & 16

Comments: The standard wordprocessor available from Radio Shack.

II. ELECTRONIC SPREADSHEETS

Title: VisiCalc
Publisher: VisiCorp
Price: $250
Machine: Apple II, IBM PC, Commodore, Radio Shack, Hewlett-Packard, Atari 800.

Comments: The first electronic spreadsheet and still one of the best. Major advantage is the large number of other programs designed to interface with it.

Title: SuperCalc
Publisher: Sorcim
Price: $295 (approximately)
Machine: Generally any CP/M based machine, also IBM PC

Comments: A very capable spreadsheet with some features VisiCalc doesn't have.

Title: Multiplan
Publisher: Microsoft
Price: $300 (approximately)
Machine: CP/M, Apple II, IBM PC

Comments: A new spreadsheet program with features to sort data and link various models together.

III. DATABASES

Title: DBASE II
Publisher: Ashton-Tate
Price: $700
Machine: CP/M based machines

Comments: A powerful relational database with many add-ons available from other vendors. On its way to becoming a standard in the microcomputer world.

Title: TDM
Publisher: Pascal Systems, Inc.
Price: $850
Machines: Apple II, Apple III, IBM PC

Comments: A Pascal based database with many features. Because it is unlocked, it is possible to interface other programs with it.

Title : Profile II
Publisher: Tandy Corporation
Price: $200
Machines: TRS MODEL II, TRS MODEL III

Comments: A file management system for the Tandy line. Very nice report capabilities and a worthwhile investment if you select a Tandy machine.

Title: DB Master
Publisher: Stoneware
Price: $229
Machine: Apple II

Comments: A popular file management system on the Apple II.

Title: Versaform
Publisher: Applied Software Technology
Price: $400-$500
Machine: Apple II, Apple III, IBM PC

Comments: A business forms processing database.

IV. GRAPHICS PACKAGES

Title: VisiTrend/VisiPlot
Publisher: VisiCorp
Price: $300
Machines: Apple II, Apple III, IBM PC

Comments: Powerful graphing program with regression analysis available. Interfaces with VisiCalc.

Title: PFS: Graph
Publisher: Software Publishing Co.
Price: $125
Machines: Apple II, Apple III

Comments: An easy to use graphing program for the Apple.

Exhibit #7
Comparison of Microcomputer Memory Sizes

Vendor/Model	Memory Capacity (Size in K Characters K = 1,024)
IBM Personal Computer	1,000
Victor 9000	896
Radio Shack Model 16	512
Cromenco System Three	512
Cromenco System Two	512
Altos ACS 8000	512
Dynabyte 5000	400
DEC Professional 325	256
DEC Rainbow 100	256
Commodore SP 9000	134
Cromenco System Zero	128
Apple III	128
DEC DECMATE II	96
Commodore CBM 8032B	96
Zenith Data System Z-89F	64
Xerox 820	64
Televideo TS802	64
Radio Shack Model II	64
Osborne Model I	64
North Star Horizon	64
Micromation	64
Kay Computer KayCompII	64
Intertec Superbrain	64
Eagle II	64
Apple II Plus	64
Vector Graphics Vector 3	56
Radio Shack Model III	48
Atari 800	48
Commodore Pet 4001	32

EXHIBIT #8

COMPUTER SYSTEM SELECTION*

Many community development (CD) directors are currently wrestling with the question of whether or not to automate some of the functions within their departments through the use of a computer. The types of computer applications which may be of interest to CD directors include project management and tracking; budgeting; and creating data bases for population, housing statistics, and housing rehabilitation data. A method for computer system selection is described in the following article.

WHAT IS THE PURPOSE OF A COMPUTER?

First and foremost a computer is a tool to help manage information. As with all tools, the computer greatly extends the ability of the user to accomplish work. A computer is used to automate functions previously done by hand, such as storage and tracking of budget data. Its primary functions are to perform calculations and to store data for current and future use.

The computer will not solve all problems, nor necessarily lead to savings in personnel time. It will not tell you what information to gather or what decisions to make. It can provide information to guide you in making decisions by leading to better use of existing data and by allowing more detailed manipulation of the data. However, the information the computer provides is only as good as the information fed into it.

WHAT IS A COMPUTER SYSTEM?

A computer system consists of two components: the software and hardware. The software refers to the sets of instructions or "program" that actually cause the electronics of the computer to perform work, whereas the hardware refers to the actual electronic parts of the system. The software part consists of systems software and applications software. Systems software are the computer programs which control the hardware and operate the entire system. Applications software refers to the computer programs which actually manipulate data, perform word processing, draw charts and graphs, perform budgeting, etc. Most applications software is written in a high level computer language, such as COBOL, PASCAL, BASIC, or FORTRAN, of which COBOL, PASCAL, and BASIC are more commonly used by local government. FORTRAN is used more for scientific and mathematical applications.

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*Taken from a presentation on Basic Computer Concepts and Computer Selection by Mr. Ali S. Montasser of McManis Associates, Inc., Washington, D.C.

The hardware part consists of the central processing unit (CPU) which contains the memory (RAM and ROM) and performs all the calculating functions, an input device (usually a keyboard), an output device (usually a screen or printer), mass storage (usually disk or tape), and possibly a communications network (links to other computers, terminals, etc.). In the central processing unit, the amount of random access memory (RAM) determines the amount of useful work a computer can do because of addressable data storage. Read only memory (ROM) is usually used for permanently installed software which drives the electronics and cannot be altered.

HOW DO YOU SELECT A COMPUTER SYSTEM?

In general, there are several factors to remember in choosing a computer system. The computer system should be cost-effective. In short, you should be able to afford to purchase the software and hardware you select. The price ranges for the different types of computers are: personal computer, $100 to $10,000; a mini-computer, $10,000 to $100,000; and a mainframe computer, $100,000 and up. The computer system should also be "user friendly" which means it is simple to operate, easy to maintain, and not intimidating. The computer system also should have software available for word processing (clerical functions such as letters and reports), data base or file management applications (such as the building and maintenance of a housing rehabilitation file), electronic spreadsheet functions (a method for automating formulas or calculations for daily use), and high level computer programming languages (COBOL, PASCAL, BASIC, FORTRAN).

In selecting a computer system, it is very important first to undertake a requirements analysis to determine the organizational need for a computer and then to determine the actual computer system requirements for both software and hardware. Only then should the choice of a system be made and its implementation initiated.

Requirements Analysis

The requirements analysis sets the stage for deciding to purchase software and hardware or to make no purchase at all. It should consist of four steps. First, a list of the organization's current functions, including office administration, grants administration, budgeting, analytical tasks, record keeping and data management, and report writing should be compiled. Second, it should be determined which functions could benefit from automation. An analysis should be made of where time can be saved; where productivity can be increased; how the level, quantity, and quality of work can be improved; and how record keeping can be made easier and data retrieval improved. Third, goals and objectives should be set for computerizing the office with an eye to improving the organization's existing capabilities, not necessarily creating new ones, and building a sound and logical case for how a computer can assist the organization to perform its role better. Staff input should be included in the requirements analysis. Fourth, the findings of the analysis should be summarized in written form by listing the proposed applications for using the computer, explaining why a computer can assist the organization in better performing its job, pointing out areas where the computer can save money and improve the capability of the organization, and stating goals and objectives to aid in the search for software.

Computer System Requirements: Software And Hardware

Software: The selection of software should precede the choice of hardware. This is to determine if you have to "make" or to "buy" software (write the computer programs for your applications yourself or buy previously written software), which can have a large influence on the selected hardware and the total cost. In undertaking the software selection, the results of the requirements analysis should be used because the software selected will be based on the applications chosen for computerization in the anaylsis.

In trying to locate sources of software and information as to software reliability and support, other organizations, independent consultants who can give an objective market evaluation, and users groups should be contacted and trade books and publications should be read. In evaluating any software, it should be tested with a hands-on demonstration. Standard "demos" should be avoided and a list of specific questions drawn up, which relate to your application, for testing. Demos are usually formulated to "highlight" the features of the software but do not necessarily include the specific aspects of your data processing application. Also, the people who are going to use the software should try it out first and references from existing users should be obtained.

In choosing software, it is important to question the vendor thoroughly concerning uses as well as any forthcoming repairs, changes, and updates to the software. Also, determine what hardware is required to run the software and what operating system it uses (systems software). This is to ensure machine compatibility, i.e., software and hardware compatibility.

Hardware: If you have a clear idea of what tasks you intend to perform based on the requirements analysis and software selection, hardware selection does not need to be a complex undertaking. Hardware should be determined by software with software dictating the type of hardware required. In addition, selection of the computer should be done using the following criteria.

Memory: Memory should include:

- minimum of 64 k (k equals 1,000 bytes of storage, a byte equals one alphabetic or numeric character) of RAM;
- expandability beyond 64 k; and
- graphics ability for charts, graphs, maps, etc.

Screen and Keyboard: Components should include:

- full size keyboard with function keys and numeric keypad,

- non-glare screen(s),
- comfortable keyboard layout for user, and
- upper and lower case letters on keyboard.

Operation and Service: Support should include:

- complete operating manuals,
- 90-day warranty, or better, and
- repair and service available locally and on-site.

Next, the type of data storage should be selected--tape or disk. Magnetic tape storage is usually associated with mini-computers and mainframe computers. There are many different types of tape units available. Tape storage is used to store data that does not require immediate user access. Depending on the data processing application, tape can be a very economical method for storing large amounts of data.

Disk storage is becoming the dominant type of storage. There are three basic types of disks. The minifloppie disks, which are five and one-quarter inches in diameter, are sufficient for spreadsheet analysis and light word processing, such as multi-page letters and short reports. The eight-inch floppie disk is better for word processing for large scale reports, such as Master Plans. The floppie disks look just like 45 RPM phonograph records. Hard disks are best for large amounts of data storage such as may be needed for very detailed and comprehensive housing rehabilitation files.

After selecting the type of storage, it is then necessary to select printers. Printers come in a variety of types, differentiated by speed, print quality, and cost. The two most common types are letter quality and dot matrix. These are primarily differentiated by print speed and print quality. Dot matrix usually prints at 60 characters per second (cps) and up, while letter quality printers usually print at 30 to 60 cps.

COMPUTER SYSTEM SELECTION

When finally choosing a computer system, the bywords should be capability and capacity. And, the final selection should only occur after undertaking the requirements analysis and determining the computer system requirements. The computer system selection should be based o the folloiwng factors: affordability, expandability, ease of operation, available software, available peripherals (hard disk units, tape units, printers, etc.), and availability of support for service and maintenance.

SECTION C

Basic Fiscal Impact Analysis
for
Local Planners

FISCAL IMPACT EXAMPLE

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FISCAL IMPACT EXAMPLE

INTRODUCTION

There are various methodologies for fiscal impact analysis, which include the per capita multiplier, case study, service standard, comparable city, proportional valuation, and employment anticipation methods. These methodologies are described in The Fiscal Impact Guidebook: Estimating Local Costs and Revenues of Land Development, prepared by the Center for Urban Policy Research at Rutgers University. A combination of several methodologies is usually incorporated in a fiscal impact analysis. This example will illustrate some of the different possible approaches for defining municipal service level relationships and cost and revenue factors.

The information in this example should be regarded as illustrative. There are a great number of possible approaches to allocating municipal service levels, as well as cost and revenue factors.

MUNICIPAL SERVICE DEMAND SCENARIO

Various demand categories can be used, depending on the objective of the analysis. In most cases, the demand scenario will include changes in population, employment, and housing types. Changes in non-residential land uses (i.e., commercial and industrial) are frequently included for a community-wide fiscal impact evaluation.

In this example the following demand categories are included.

- Population--cumulative
- Employment--cumulative
- Single-family Dwellings--annual and cumulative
- Townhouses--annual and cumulative
- Garden Apartments--annual and cumulative
- High-rise Apartments--annual and cumulative
- Mobile Homes--annual and cumulative
- Industrial Space--annual and cumulative
- Office Space--annual and cumulative
- Retail Space--annual and cumulative
- Acres Developed--annual and cumulative

This example evaluates the fiscal impact of changes in these demand categories over a 20-year time period. These figures should be supported by a narrative which explains why and how the numbers were projected. Because the projections "drive" the fiscal calculations, an interested party must be able to understand how the numbers were determined.

The number and type of demand categories depend on the particular objective of the analysis. In this case, we are evaluating the fiscal impacts related to one geographic area. A number of geographic subareas could be evaluated simultaneously. Regardless, the determination of demand scenario information may be the most time-consuming part of the fiscal impact process, because the individual categories must reflect an established or potential policy or alternative, with a supporting written rationale.

SERVICE LEVEL, COST, AND REVENUE INFORMATION FOR MUNICIPAL SERVICES

The remainder of the data collection effort relates to ascertaining the service level and related cost and revenue factors for each of the municipal departments to be analyzed, as well as all revenue sources. Assuming that the user knows what type of information to look for and what questions to ask, most of the data collection effort can be completed in one to three interviews with each department. The paragraphs below indicate some of the more common ways of assigning service level and cost and revenue factors to municipal departments.

General Government

The example includes the following general government activities:

- Mayor and Council
- City Manager
- Public Information
- Program Development and Management
- Personnel
- Legal
- Budget
- Finance Administration
- Insurance/Bonds
- Tax Collection
- Central Purchasing
- Data Processing
- Planning/Zoning
- Community Development/Housing
- Engineering
- City Clerk
- Property Maintenance

In most situations, the activities of general government are primarily a function of population, and, therefore, they are allocated on a per capita basis. Most general government activities impact all residents of a community, directly or indirectly, and more uniformly than do many other municipal department services or activities. Another approach would be to allocate some of the general government services and associated costs to employment as well as, or in addition to, population. In this case, costs would be allocated on a per population and/or a per employment basis.

Several of the municipal departments may have relatively fixed costs up to a threshold. A county council will probably not expand the number of council members, and it may not even enlarge its staff in the foreseeable future. If this were the case, then these costs would be fixed (i.e., not related to community growth or development). A legal department may also have fixed costs projected under normal circumstances.

In this subsystem, all of the costs are allocated on a per capita basis, except building inspection. For building inspection, a factor is allocated against each new single-family house, townhouse, garden apartment, high-rise apartment, and mobile home constructed in the example. These are one-time fees which are based on the annual levels of new construction.

Police Department/Corrections

In this example, there are several components to the police/corrections function. These include the following:

- Police Department
- Adult Corrections
- Youth Corrections
- Courts
- Police Revenues

The easiest method for projecting the need for police services is to generate the need for police patrols and other personnel, as well as related equipment and facilities, according to population. Other, more sophisticated, approaches use response time and/or land use density. Generally, the determination of the service level allocation will be a function of the type of information the police department currently collects. For smaller communities, the allocation of police services on a per capita basis may be necessary for the initial fiscal evaluations. Once the police department understands how fiscal analysis can be used, it may attempt to collect the appropriate information for more sophisticated analyses.

Another approach, which is more practical when evaluating a small community or a subarea of a community, is to determine the threshold at which a new patrol or substation will be required. For example, a police department could probably indicate that once there were a certain number of dwelling units in a developing area, a new patrol or substation would be needed to patrol that area properly.

For the Police Department, it is assumed that an administrator will be needed for every 3,333 persons in the resident population, that a support staff person will be needed for every 2,000 persons, and that 7 patrol officers will be needed for every 5,000 persons. The staff operating costs should include all salaries, benefits, uniforms, and training; the equipment operating costs cover items such as radios, lab equipment, special equipment, guns, etc. For police vehicles, it is assumed that one vehicle will be needed for every three patrol personnel, and that each vehicle has a useful life of 3 years and costs $9,400. These vehicles are then replaced every three years, in addition to the new vehicles generated by the demand scenario.

The assumptions for the jail anticipate 0.9 prisoners per 1,000 population and a capacity of three cells in the existing jail. Any addition to the jail will be built in increments of 15 cells for $320,000, bonded for 30 years at 7.5 percent interest. For the youth corrections center, it is assumed that 0.2 youths per 1,000 people will be referred to the facility, and that one bed remains unused in the present building. New demand will be satisfied by building four-bed wings at a cost of $7,000 per bed, using non-debt financing. The city court costs and the police revenues are allocated per capita.

Fire

The fire service includes fire stations, emergency medical vehicles, and paramedic services. The various methodologies that can be used for projecting fire demands and costs are similar to those mentioned regarding police. Generally, the determination of the required new facilities is easier than for police, since fire service requirements are usually related to response times to various service areas, the types of non-residential land use, and the height of the new buildings or other improvements. In this example, information on each new fire station is entered directly in a particular year, at a cost of $370,000 for both the station and fire-fighting equipment. Costs are bonded for 30 years at 7.5 percent interest. The useful life is 25 years. An emergency medical unit is also entered directly at a cost of $34,000, using non-debt financing, and having a useful life of 15 years. The operating requirements are a function of the number of new fire stations and emergency vehicles, which generate demand for added personnel.

Water and Wastes

The demand for utilities is frequently a function of population, employment, or land-use activities. Where site-specific development is being evaluated, the actual determination of the necessary new pipes can be included. The water and wastes department includes the following costs and/or revenue elements: water production and distribution; water treatment plant and distribution system additions; sewer system operations; sewage collection system additions; refuse collection; refuse disposal; refuse vehicles; water and sewer user fees; and water and sewer tap fees.

An estimated water demand of 170 gallons per capita per day is used for this service. This includes light commercial activity and leakage, over and above the personal use of 100 gallons per day. Annual costs for operations and maintenance of the water treatment/distribution facilities are estimated at $45.00 per thousand gallons of average daily flow through the system. Costs for a treatment plant addition are included at $600,000, and bonded for 30 years at 7.5 percent interest. Costs for several expansions of the distribution system are estimated to range between $100,000 and $250,000, with the same bonding terms.

Sewage treatment costs are based on an estimated average generation rate of 165 gallons per day per capita and a cost factor of $85.00 per thousand gallons of average daily flow. Costs for a 2.5 mgd (millions of gallons per day) expansion of the sewage treatment facility are estimated at $6.25 million. However, federal funding equal to 75 percent of the cost would reduce the local share to roughly $1.56 million, to be bonded for 30 years at 7.5 percent. Trunkline expansions are projected to cost $560,000 during the 20-year period, bonded under the same terms. Estimates of optimum size for a facility expansion such as those projected will normally be determined by city staff or consulting sanitary engineers, based on local needs, conditions, and construction costs. Operating costs can be projected using historical information, modified as needed to reflect such factors as new treatment procedures or staffing thresholds.

The assumptions regarding refuse generation are one ton per person per year, and 2.6 persons average per new housing unit. The estimated cost for refuse collection is $15.00 per ton, and $3.00 for disposal. These figures include allocation of commercial refuse generated. Among the other assumptions are that each truck serves approximately 1,000 dwelling units, costs about $55,000, and has a 5-year life. It is assumed that the landfill has ample capacity for 20 years.

The water and sewer user fee used for this service is $1.60 per 1,000 gallons of metered water use, which is assumed to equal one half the total daily use in the community. Tap fees are also included at the rate of $400 for a single-family unit; $380 for a townhouse unit; and $300 for a garden apartment, high-rise, or mobile home unit. The fees for commercial space are assumed to be $.40 per square foot.

Available or excess capacity in capital facilities, bonding terms, and other capital facility information can be utilized to indicate when the capacities would be exhausted, when new construction would need to be undertaken, and what the cost and/or revenue impacts of new facilities will be.

Transportation

The transportation department includes street and road maintenance and construction. New streets of all types are generated by the estimated footage required for each type of housing unit: 53.4 feet per single family unit: 16.5 feet per townhouse; 8.4 feet per garden apartment; 4.6 feet per high-rise unit; and 29.7 feet per mobile home. The annual cost for maintaining new street mileage is $2,450 per mile. It is also assumed that each 1,000 industrial square feet will generate 4.0 feet of locally maintained street; each 1,000 square feet of office space in a suburban office park setting will generate 1 foot of street; and retail activity will result in 8 feet of locally maintained street per 1,000 square feet of retail space.

For this service, collector streets and minor arterials constructed by the jurisdiction are projected on the following basis: 15.6 feet per single-family unit; 6.4 feet per townhouse unit; 5.6 per garden apartment unit; 4.3 feet per high-rise unit; and 7.1 feet per mobile home unit. All non-residential activities are assumed to be located on state roads or developer-provided roads; construction of all subdivision streets is also assumed to be the developer's responsibility. The local costs for constructing collectors and minor arterials are assumed to be $480,000 per mile, with 70 percent federal funding. A more accurate methodology for projecting collector and minor arterials is to utilize a transportation forecasting model or conduct an actual traffic count and flow study. However, this may be too costly and time-consuming for most fiscal evaluations.

Libraries

For this service, a per capita cost is allocated to cover operating expenses for libraries. For capital facilities, it is assumed that a branch can effectively serve 20,000 persons. The branch will be about 7,000 square feet and cost $485,000, which will be bonded for 30 years at 7.5 percent interest. Other methodologies would be to allocate the operating cost based on each new branch, or on book circulation.

Health and Social Programs

The following categories are included under health and social programs:

- Health
- Elderly Services
- Children's Services
- Community Services

For this service, it is assumed that the central health facility has capacity for expansion and serving new populations. The elderly services are projected on the basis of 20 percent of the population being in the elderly category and applying a cost per client. The children's services are allocated in a similar fashion, with children projected as 40 percent of the new population increase. The community services are allocated on a per capita basis.

Unless the population projections (demand scenario category) are made according to age categories, the most common approach to projecting specific age groups is allocating a percentage of the new population into the age group. This projection can be based on census data, other more recent surveys, or a specific knowledge of the type of development being considered.

Parks and Recreation

The parks and recreation service consists of recreation programs, two types of new parks, and revenues. Typical operating costs for parks and recreation programs are allocated on a per capita basis. For this service, there are two types of parks that are projected—neighborhood and community. A neighborhood park is assumed to serve 5,000 people and require a local cost of $290,000, which is bonded. A community park will service 25,000 people and require $500,000 for the local share of total acquisition and development costs. The park system revenues are also based on a per capita allocation. The most simplistic methodology for parks and recreation is to use a strict per capita approach for all parks and recreation activities. A more sophisticated methodology would be to generate operating costs by type of park. This would be accomplished by generating a certain number of staff persons and equipment once a new park is needed. The new equipment would be a one-time purchase, while the staff and other operating costs would be an annual expense.

Education

Education costs (operating and capital) are allocated among elementary, junior high, and senior high schools. Revenues are treated in a unified way because it is assumed that the schools belong to a unified district (K through 12). Operating costs include those for instruction, administration, transportation, and building maintenance and operations. Costs for instruction and administration are projected per teacher, using pupil-staff ratios, while other costs are projected per pupil.

Available classroom space is used to project the time when new facilities will be required (i.e., when capacity is reached). Standard school sizes and costs for each type of facility would be determined locally. All capital costs are bonded.

A more sophisticated methodology than the one used in this example might project different types of school facility construction according to the level of increase in pupil enrollment. For example, a school might be able to accommodate 28 pupils, and then purchase up to three portable classrooms. After the three portable classrooms, an addition might be built on the school, before a new school would be constructed.

The final category is school system revenues, which includes various sources, including state and federal aid. These revenues sources are normally a function of the number of pupils. Property tax revenues, which are based on the market value of new construction, are calculated separately and included in revenues below.

Revenues

There are a number of general revenue categories which are allocated according to the various demand scenario categories. For this example, the revenue source and the allocation method are as follows:

1. Liquor licenses--per capita
2. Regulated business licenses--per capita
3. Miscellaneous service charges--per capita
4. State-shared auto licenses--per capita
5. General business licenses--per employee
6. State-shared truck licenses--per employee
7. Utility gross receipts tax--per capita/employee
8. Local sales tax--per 1,000 sq. ft. of new retail space
9. Building permit revenue--by type of new construction
10. Deed taxes--by type of new construction and market value
11. Residential property taxes--by type of residential unit, market value, and assessed value
12. Mobile home property taxes--by type of residential unit, market value, and assessed value
13. Household personal property tax--average current value per capita and assessed value

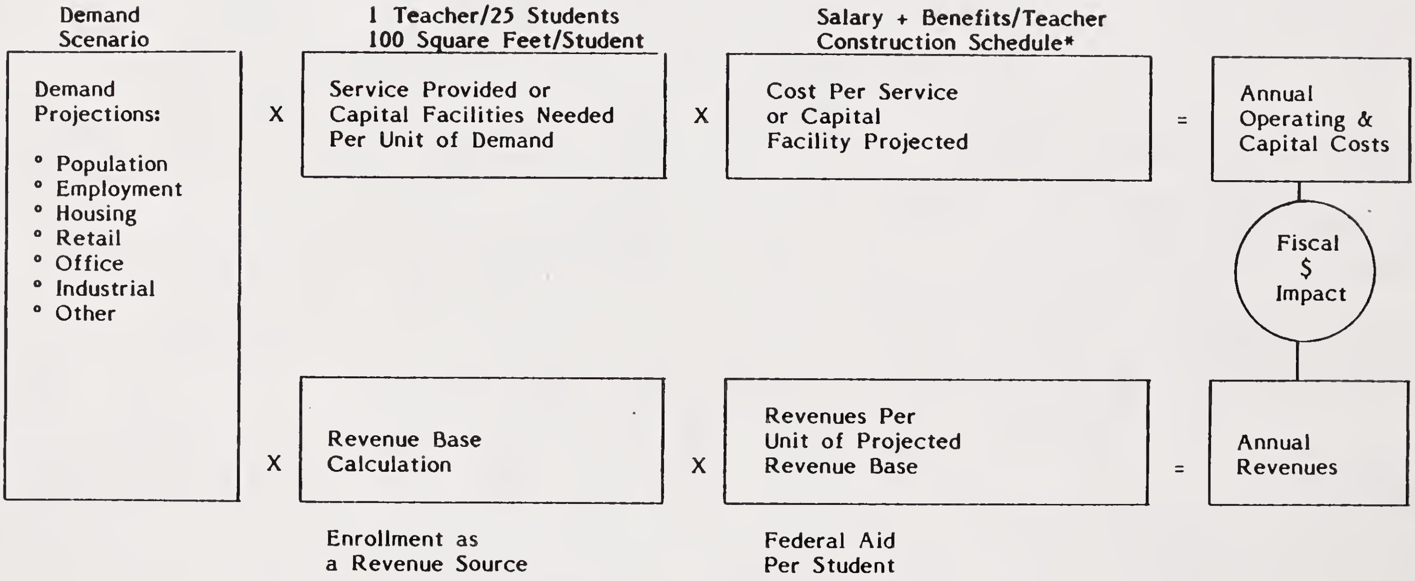
14. Commercial property taxes--by type of commercial property, market value, and assessed value
15. Business personal property tax--average current value per employee and assessed value
16. Utility company property tax--average current value per capita/employee and assessed value
17. Vacant land property tax losses as land developed--average market value per acre and assessed value lost

The first ten revenue types are considered as general revenues because they are not part of the community's real and personal property tax base, and they do not relate directly to any specific department's operations. The remaining seven revenues are property revenues. In this example, uniform assessment and tax rates are assumed for all property taxes.

FISCAL RESULTS

The fiscal impact analysis should show the net costs or revenues by department, the net surplus or deficit for the jurisdiction, the tax rate or other revenue source required to cover any deficits, the impact on bonding capacity, and the amount of bonded indebtedness incurred. If possible, also show the demand for services as reflected in staff requirements and capital facility needs, where appropriate.

FISCAL IMPACT CALCULATION PROCESS



*The construction schedule is projected based on existing available capacity and locally derived data regarding facility size, costs, and bonding terms.

THE APPLICATIONS AND TRADEOFFS OF FISCAL IMPACT ANALYSIS

by Ali S. Montasser

ABSTRACT. Fiscal impact analyses are becoming increasingly important to local government decision-makers. This article discusses a variety of applications for fiscal analysis techniques, as well as the characteristics of successful analyses. Advantages of fiscal impact analysis include: focusing debate on verifiable assumptions; enhancing knowledge of actual local service levels, costs, and revenues; developing understanding of the likely range of future fiscal conditions; and hastening the collection and synthesis of local data. The major tradeoffs involve the commitment of staff time to conduct the analysis and explain it to the public, and possible overemphasis on fiscal versus other impacts.

INTRODUCTION

"If there is less money to go around, it's the planners who are best equipped to point the way for communities to proceed." This statement by the Deputy Director of the American Planning Association, quoted in the San Francisco Examiner and Chronicle, succinctly presents the opportunity for planners to become more involved in the jurisdictional planning, management, and budgeting process. Willing or not, unless planners evaluate the fiscal impacts or proposed community actions, planning departments may find themselves losing credibility and their ability to influence local policy choices. This article discusses some of the applications and tradeoffs of such fiscal impact evaluations.

Definition of Fiscal Impact Analysis

A fiscal impact evaluation should allow interested parties to understand the impact on public service demands and the resulting costs, revenues, bonding, and taxes associated with the activity being evaluated. To be useful to decision-makers, this evaluation should be straightforward, use meaningful local data, and be written in a cogent manner.

APPLICATIONS OF FISCAL ANALYSIS

One of the major advantages of a fiscal impact analysis is its usefulness for a number of applications. A planning department which provides the meaningful information from fiscal evaluations can become an important factor in the overall planning, management, and budgeting decisions in a community.

The most obvious application for fiscal evaluations is in the area of planning itself. Evaluating the public service demands and resulting fiscal impacts of comprehensive and master plans, site specific development alternatives, rezoning, and revitalization and economic development strategies are among some of the planning applications of a fiscal impact process.

Another important application for fiscal analysis is capital facility forecasting. A good fiscal impact evaluation will consider the existing capacity of capital facilities and then, annually, project the time when new facilities will be needed, the amortization schedule if financed, and even the remaining facility capacity. A number of planning departments are responsible for developing capital improvement (facility) programs (CIP). Unfortunately, some of these departments do not monitor the CIP once it has been adopted to ascertain whether the program should be altered due to changes in the community. A good fiscal system will enable planners to provide advice to executive and administrative officials regarding both preparation and administration of the CIP.

Another application of fiscal evaluations is assessing the impact of changes in service levels. As the demographic and economic characteristics of a community change, as fiscal constraints force a retrenchment in budget allocations, or as specific interest groups request additional services, a fiscal impact analysis can evaluate the changes in costs and revenues resulting from different service level assumptions. For example, a planner could evaluate a wide range of alternative recreation standards, and the resulting impact on costs, through a good fiscal impact process.

An increasingly necessary application of fiscal analysis is evaluating the impact of expenditure limitations. A number of states and communities have adopted aspects of California's Proposition 13, with the result that expenditure increases are in some cases severely constrained. A fiscal impact evaluation will allow a better understanding of the options for constrained expenditures. For example, to evaluate the impact of different inflation rates, the planner might use different service level assumptions or development staging to minimize public sector cost increases.

Fiscal evaluations also are used for revenue forecasting. Examples of revenue forecasting are: Evaluating the various effects of different user fees, changes in federal and state funding requirements, and increases or decreases in real property taxes based on development alternatives. In addition, budget officials could use a fiscal process to generate revenue forecasts as input for annual budget preparation.

Another useful application of fiscal evaluations relates to forecasting departmental budgets and the overall fiscal picture of the jurisdiction. If a community had a fiscal software system, each department could have its own data file, while the planning department (assuming it were responsible for fiscal evaluations) would have the master file combining all the departments. The planning and budget staffs, and other departments, would then be able to prepare different fiscal forecasts under different assumptions.

This brief discussion represents only a few of the possible applications of fiscal impact analysis.

ADVANTAGES AND LIMITATIONS OF FISCAL IMPACT ANALYSIS

Fiscal impact analysis involves tradeoffs between detail and simplicity, and between openness of the process and efficiency in completing an evaluation. In general, inclusion of explicit, detailed assumptions, and focus on locally collected information regarding marginal costs and revenues, will provide valuable credibility for the evaluation results without unduly burdening the analyst or delaying the process. Also, implementation of a computerized fiscal analysis system allows for sensitivity analyses to test alternative input assumptions. This, too, will tend to enhance the credibility of results, without the need for re-calculation by hand. As with many types of analyses, data limitations of some type will almost always exist. However, the results of even a limited analysis are usually far more informative than no analysis at all, and sensitivity evaluations can be used in place of specific data assumptions which cannot be determined readily.

Drawbacks related to fiscal analysis are mainly that staff time and budget dollars are required, and that fiscal impacts may become the sole focus of attention, because of their seeming concreteness. It is also true that a fiscal analysis may reveal some staff or official assumptions to unwelcome public scrutiny. These drawbacks, however, are present with almost any attempt by public agencies to look ahead and evaluate options for the future. The alternative is simply to react to conditions as they emerge, which is not usually considered to be a professional or responsible course.

Explicit Assumptions

An advantage of well-designed fiscal analyses is that all assumptions are explicit. Therefore, the assumptions and study results will be more credible and better able to withstand public scrutiny. The demographic, economic, and service level assumptions, as well as cost and revenue factors, should be included in the fiscal report or an appendix. An accompanying narrative should discuss how the rationale and data were obtained so that the reader can easily understand the reasonableness of the assumptions. With the input assumptions made explicit, the overall thought process for the particular analysis is usually improved because the planner must speak in specifics, not generalities. Another important by-product of providing the rationale and data factors is that it is incumbent upon those who disagree with the input assumptions to provide their own supporting rationale and data.

Localized Data Collection

A good fiscal evaluation will encourage the user to focus on local data. The need for localized data is illustrated by a fiscal impact evaluation conducted for four contiguous townships in Rhode Island. The townships had a similar population and a fairly similar geographic configuration. In collecting the service level rationale and cost and revenue factors for the fiscal impact evaluation for each township, it was found that only 20 percent of the service levels were similar. There were even fewer similar cost, and revenue factors. These dissimilarities in services, costs, and revenues are almost always present, due to local preferences and political factors.

Marginal Costs and Revenues

In addition to localized data, the fiscal analysis should focus on the marginal or incremental costs and revenues. It will probably be necessary to include some average or per capita costs, but the major focus should be on the marginal effects of community changes being evaluated, particularly regarding capital facilities. In a jurisdiction which has a stable or declining population, it could be that new development will generate minimal additional costs. Conversely, in a growing community, a certain amount of new development could generate a considerably higher amount of new capital and operating costs, or relatively little, depending on existing facility capacities, geographic location of development, and so forth. From the standpoint of local budgeting and capital improvement programming, marginal effects are all-important.

Sensitivity Evaluations

If a community has implemented a fiscal impact process or system, it will then be much easier to conduct sensitivity analyses. Sensitivity evaluations, the asking of "what if" questions, are often an important part of effectively using fiscal impact evaluations. A meaningful fiscal evaluation might be substantially impacted by changes in service levels, costs, revenue, and a host of other assumptions. The fiscal analyst or decision-maker may well ask a series of "what if" questions, in order to understand the optimal course of action that should be taken or recommended. Evaluating alternative development plans, comprehensive plans, public service standards, and costs and revenue assumptions are examples of areas in which sensitivity evaluations could be conducted.

Data Limitations

The most frequent argument for not evaluating fiscal impacts is that there is not sufficient data, or that the data required is excessive. That response implies that it is better not to conduct a fiscal evaluation if the data are imprecise or limited in any way. However, a more appropriate response would be to recognize the limitations and advantages of fiscal analysis.

Assuming that the planner wishes to provide meaningful information regarding planning, management, and budgeting, the real question becomes the extent of the required data collection effort. The most simplistic fiscal analysis process is the per capita approach. In this case, the analyst could generate all of the cost and revenue factors in a matter of hours. The other extreme is to attempt to obtain the most scientific and precise information available from the jurisdictional departments regarding service levels and costs and revenues. If a community has an unlimited budget, labor allocation, and time, then this latter approach might be worthwhile. However, the real world usually precludes this. The usual process is that an analyst needs from one to three interviews to properly obtain relevant service level, cost, and revenue information. The planner can use sensitivity evaluations to determine the impact of different service level, cost, and revenue assumptions.

If the data and information collected are relevant to fiscal analysis, they will probably either be on hand or sought for other purposes as well. The fiscal process just hastens data gathering. The planner should consult with the jurisdictional departments to obtain the service level relationships, population, and cost and revenue factors. This type of information should be known by the planners to become a more integral part of the planning, management, and budgeting process.

As stated earlier, it is important for the planner to describe the basis for the assumptions in a narrative fashion for all interested parties to understand. Of course, once the initial service level rationale and cost revenue factors are obtained, then a formal fiscal process can be maintained and used very effectively with a minimal amount of additional data gathering. The major focus of data gathering in the future would then be updating service level assumptions and the cost and revenue factors.

Staff Time for Fiscal Analysis

Based on our experience, the labor costs for collecting the relevant and necessary data in a community will probably range from one quarter to three quarters of a person-year. In most cases, this translates to one or two persons working on the initial data collection effort. The cost for calculating and evaluating the fiscal results depends on whether a computer software system is used and on the number of alternatives analyzed. Even in instances where communities have purchased and are using a fiscal software system, few, if any, individuals are working on evaluations full-time. Of course, with a software system the capability of conducting a host of fiscal evaluations in a relatively short time span is significant. Whether the labor costs are too great depends on whether fiscal evaluations need to be or are being conducted in the jurisdiction. It is likely that these costs will be insignificant because of the potential cost savings that can be shown by evaluating different fiscal alternatives.

Fiscal Effects Among Other Impacts

It is possible that certain parties will focus on fiscal results to the exclusion of all other considerations, such as social and environmental concerns. However, one of the indirect benefits of conducting fiscal evaluations is that the presence of quantitative information will encourage those who are evaluating environmental and social issues to attempt to quantify and become more explicit about potential impacts.

In any fiscal evaluation, other concerns should be addressed. On the other hand, the relatively recent fiscal constraints being experienced by most jurisdictions will force a greater weight to be given to fiscal evaluations. A community can have the highest ideals and aspirations, but without the funds to finance the provision of these ideals, they will not be achieved.

Public Involvement in Decision-Making

Often a decision-maker such as a planning director or an executive officer, might prefer that the data assumptions and ultimate fiscal impacts evaluated not be public, because they would more clearly show the decision-making process and the modus operandi. Assuming that the fiscal evaluation process is straightforward and easy for interested parties to understand, this would occur. However, those who value the principle of open decision-making are increasingly forcing local officials to justify their decisions, and fiscal analyses can provide a basis for explaining how decisions are reached.

The above discussion has attempted to indicate some of the advantages and limitations of fiscal impact evaluations. Although they are not meant to be all-inclusive, they do show that fiscal analyses can provide significant advantages to planning departments in gaining more credibility and effectiveness in the complex arena of local decision-making.

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